

In the Claims

Please amend the claims as follows:

1 1. (Currently Amended) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a number of pixels of image data having illumination intensity levels
4 within a first defined range of illumination intensity levels;

5 (b) determining an illumination intensity level mapping function based upon the
6 determined number of pixels within the first defined range of illumination intensity levels;

7 (c) determining a transfer control function based on the determined illumination intensity
8 level mapping function; and

9 (d) imposing the determined transfer control function upon a pixel of the digital imager;

10 e) determining a number of pixels having illumination intensity levels within a second defined
11 range of illumination intensity levels; and

12 (f) determining an integration time based upon the determined number of pixels having
13 illumination intensity levels within a second defined range of illumination intensity levels;

14 said determination of the transfer control function being determined based on the
15 determined illumination intensity level mapping function and the determined integration time.

1 2. Cancelled

1 3. (Original) The method as claimed in claim 1, wherein (a) – (d) are repeated until a
2 desired dynamic range is realized.

1 4. (Original) The method as claimed in claim 1, wherein the first defined range of
2 illumination intensity levels is a range of illumination intensity levels including an illumination
3 intensity level representing pixel saturation.

1 5. (Currently Amended) The method as claimed in claim 21, wherein the second defined
2 range of illumination intensity levels is a range of illumination intensity levels including an
3 illumination intensity level representing a minimum illumination intensity level.

1 6. (Currently Amended) The method as claimed in claim 21, wherein the first defined
2 range of illumination intensity levels is a range of illumination intensity levels including an
3 illumination intensity level representing pixel saturation and the second defined range of
4 illumination intensity levels is a range of illumination intensity levels including an illumination
5 intensity level representing a minimum illumination intensity level adjusted for a pixel offset
6 value.

1 7. (Original) The method as claimed in claim 1, wherein said determination of a number
2 of pixels of image data having illumination intensity levels within a first defined range of
3 illumination intensity levels determines a number of pixels of image data having illumination
4 intensity levels within a first defined range of illumination intensity levels from a frame of pixels
5 of image data created by the digital imager.

1 8. (Original) The method as claimed in claim 1, wherein said determination of a number
2 of pixels of image data having illumination intensity levels within a first defined range of
3 illumination intensity levels determines a number of pixels of image data having illumination
4 intensity levels within a first defined range of illumination intensity levels from a partial frame of
5 pixels of image data created by the digital imager.

1 9. (Original) The method as claimed in claim 1, wherein said determination of a number
2 of pixels of image data having illumination intensity levels within a first defined range of
3 illumination intensity levels determines a number of pixels of image data having illumination
4 intensity levels within a first defined range of illumination intensity levels from a defined area
5 within a frame of pixels of image data created by the digital imager.

1 10. (Original) The method as claimed in claim 1, wherein said determination of a number
2 of pixels of image data having illumination intensity levels within a first defined range of
3 illumination intensity levels determines a number of pixels of image data having illumination
4 intensity levels within a first defined range of illumination intensity levels from a user-defined
5 area within a frame of pixels of image data created by the digital imager.

1 11. (Original) The method as claimed in claim 1, wherein the determined illumination
2 intensity level mapping function is a calculated illumination intensity level mapping function, the
3 calculation being based upon the determined number of pixels within the first defined range of
4 illumination intensity levels.

1 12. (Original) The method as claimed in claim 1, wherein the determined illumination
2 intensity level mapping function is a selected illumination intensity level mapping function
3 selected from a plurality of pre-specified illumination intensity level mapping functions, the
4 selection being based upon the determined number of pixels within the first defined range of
5 illumination intensity levels.

1 13. (Original) The method as claimed in claim 1, wherein the determined transfer control
2 function is a calculated transfer control function, the calculation being based upon the
3 determined illumination intensity level mapping function.

1 14. (Original) The method as claimed in claim 1, wherein the determined transfer control
2 function is a selected transfer control function from a plurality of pre-specified transfer control
3 functions, the selection being based upon the determined illumination intensity level mapping
4 function.

1 15. (Currently Amended) The method as claimed in claim ~~21~~, wherein the determined
2 transfer control function is a calculated transfer control function, the calculation being based
3 upon the determined illumination intensity level mapping function and determined integration
4 time.

1 16. (Currently Amended) The method as claimed in claim 21, wherein the determined
2 transfer control function is a selected transfer control function from a plurality of pre-specified
3 transfer control functions, the selection being based upon the determined illumination intensity
4 level mapping function and determined integration time.

1 17. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a number of pixels of image data having illumination intensity levels
4 within a first defined range of illumination intensity levels;

5 (b) determining an illumination intensity level mapping function based upon the
6 determined number of pixels within the first defined range of illumination intensity levels;

7 (c) determining a transfer control function based on the determined illumination intensity
8 level mapping function; and

9 (d) imposing the determined transfer control function upon a pixel of the digital imager;
10 said determination of a number of pixels of image data having illumination intensity
11 levels within a first defined range of illumination intensity levels determines a number of pixels
12 of image data having illumination intensity levels within a first defined range of illumination
13 intensity levels during a period of time that the digital imager is creating a second frame of
14 pixels;

15 said determination of an illumination intensity level mapping function determines an
16 illumination intensity level mapping function based upon the determined number of pixels of
17 image data having illumination intensity levels within a first defined range of illumination
18 intensity levels during the period of time that the digital imager is creating the second frame of
19 pixels; and

20 said imposition of the determined transfer control function imposes the determined
21 transfer control function upon a pixel of the digital imager during a third frame of pixels of
22 image data being created by the digital imager.

1 18. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a number of pixels of image data having illumination intensity levels
4 within a first defined range of illumination intensity levels;

5 (b) determining an illumination intensity level mapping function based upon the
6 determined number of pixels within the first defined range of illumination intensity levels;

7 (c) determining a transfer control function based on the determined illumination intensity
8 level mapping function; and

9 (d) imposing the determined transfer control function upon a pixel of the digital imager;
10 said determination of a number of pixels of image data having illumination intensity
11 levels within a first defined range of illumination intensity levels determines a number of pixels
12 of image data having illumination intensity levels within a first defined range of illumination
13 intensity levels during a period of time that the digital imager is creating a first frame of pixels;

14 said determination of an illumination intensity level mapping function determines an
15 illumination intensity level mapping function based upon the determined number of pixels of
16 image data having intensity levels within a first defined range of intensity levels during the
17 period of time that the digital imager is creating the first frame of pixels; and

18 said imposition of the determined transfer control function imposes the determined
19 transfer control function upon a pixel of the digital imager during a second frame of pixels of
20 image data being created by the digital imager.

1 19. (Currently Amended) The method as claimed in claim 21, wherein the illumination
2 intensity level mapping function is determined independently of the determination of the
3 integration time.

1 20. (Currently Amended) The method as claimed in claim 21, wherein the determinations
2 of the illumination intensity level mapping function and integration time are dependent
3 thereupon.

1 21. (Currently Amended) The method as claimed in claim 21, wherein the illumination
2 intensity level mapping function is determined prior to the determination of the integration time.

1 22. (Currently Amended) The method as claimed in claim-21, wherein the illumination
2 intensity level mapping function is determined after the determination of the integration time.

1 23. (Currently Amended) The method as claimed in claim 21, wherein determinations of
2 the illumination intensity level mapping function and the integration time are determined
3 substantially simultaneously.

1 24. (Original) The method as claimed in claim 12, wherein the number of illumination
2 intensity level mapping functions to select from is eight.

1 25. (Original) The method as claimed in claim 1, further comprising:
2 (d) determining, for each of a plurality of defined ranges of illumination intensity levels,
3 a number of pixels within the defined range of illumination intensity levels when the determined
4 number of pixels within the first defined range of illumination intensity levels is above a first
5 threshold; and
6 (e) determining, for each defined range of illumination intensity levels, an illumination
7 intensity level mapping function based upon the determined number of pixels within the defined
8 ranges of illumination intensity levels.

1 26. (Currently Amended) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a plurality of numbers of pixels, each determined number of pixels being
4 a number of pixels within an associated defined range of illumination intensity levels;

5 (b) determining a plurality of illumination intensity level mapping functions, each
6 determined illumination intensity level mapping function corresponding to one defined range of
7 illumination intensity levels, each illumination intensity level mapping function being
8 determined based upon the determined number of pixels within an associated defined range of
9 illumination intensity levels;

10 (c) determining a transfer control function based on the plurality of determined
11 illumination intensity level mapping functions; and

12 (d) imposing the determined transfer control function upon a pixel of the digital imager;

1 (e) determining a number of pixels having illumination intensity levels within a specified
2 range of illumination intensity levels; and

3 (f) determining an integration time based upon the determined number of pixels having
4 illumination intensity levels within a specified range of illumination intensity levels;

5 said determination of the transfer control function being determined based on the
6 plurality of determined illumination intensity level mapping functions and the determined
7 integration time.

1 27. Cancelled

1 28. (Original) The method as claimed in claim 26, wherein (a) – (d) are repeated until a
2 desired dynamic range is realized.

1 29. (Currently Amended) The method as claimed in claim ~~27~~26, wherein the specified
2 range of illumination intensity levels is a range of illumination intensity levels including an
3 illumination intensity level representing a minimum illumination intensity level.

1 30. (Currently Amended) The method as claimed in claim ~~27~~26, wherein the specified
2 range of illumination intensity levels is a range of illumination intensity levels including an
3 illumination intensity level representing a minimum illumination intensity level adjusted for a
4 pixel offset value.

1 31. (Original) The method as claimed in claim 26, wherein said determination of a
2 plurality of numbers of pixels determines each number of pixels corresponding to one defined
3 range of illumination intensity levels from a frame of pixels of image data created by the digital
4 imager.

1 32. (Original) The method as claimed in claim 26, wherein said determination of a
2 plurality of numbers of pixels determines each number of pixels corresponding to one defined
3 range of illumination intensity levels from a partial frame of pixels of image data created by the
4 digital imager.

1 33. (Original) The method as claimed in claim 26, wherein said determination of a
2 plurality of numbers of pixels determines each number of pixels corresponding to one defined
3 range of illumination intensity levels from a defined area within a frame of pixels of image data
4 created by the digital imager.

1 34. (Original) The method as claimed in claim 26, wherein said determination of a
2 plurality of numbers of pixels determines each number of pixels corresponding to one defined
3 range of illumination intensity levels from a user-defined area within a frame of pixels of image
4 data created by the digital imager.

1 35. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a plurality of numbers of pixels, each determined number of pixels being
4 a number of pixels within an associated defined range of illumination intensity levels;

5 (b) determining a plurality of illumination intensity level mapping functions, each
6 determined illumination intensity level mapping function corresponding to one defined range of
7 illumination intensity levels, each illumination intensity level mapping function being
8 determined based upon the determined number of pixels within an associated defined range of
9 illumination intensity levels;

10 (c) determining a transfer control function based on the plurality of determined
11 illumination intensity level mapping functions; and

12 (d) imposing the determined transfer control function upon a pixel of the digital imager;
13 said determination of a plurality of numbers of pixels determines each number of pixels
14 corresponding to one defined range of illumination intensity levels during a period of time that
15 the digital imager is creating a second frame of pixels;

16 said determination of a plurality of illumination intensity level mapping function
17 determining each illumination intensity level mapping function corresponding to one of the
18 defined ranges of illumination intensity levels during the period of time that the digital imager is
19 creating the second frame of pixels; and

20 said imposition of the determined transfer control function imposes the determined
21 transfer control function upon a pixel of the digital imager during a third frame of pixels of
22 image data created by the digital imager.

1 36. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a plurality of numbers of pixels, each determined number of pixels being
4 a number of pixels within an associated defined range of illumination intensity levels;

5 (b) determining a plurality of illumination intensity level mapping functions, each
6 determined illumination intensity level mapping function corresponding to one defined range of
7 illumination intensity levels, each illumination intensity level mapping function being
8 determined based upon the determined number of pixels within an associated defined range of
9 illumination intensity levels;

10 (c) determining a transfer control function based on the plurality of determined
11 illumination intensity level mapping functions; and

12 (d) imposing the determined transfer control function upon a pixel of the digital imager;
13 said determination of a plurality of numbers of pixels determines each number of pixels
14 corresponding to one defined range of illumination intensity levels during a period of time that
15 the digital imager is creating a first frame of pixels;

16 said determination of a plurality of illumination intensity level mapping function
17 determining each illumination intensity level mapping function corresponding to one of the
18 defined ranges of illumination intensity levels during the period of time that the digital imager is
19 creating the first frame of pixels; and

20 said imposition of the determined transfer control function imposes the determined
21 transfer control function upon a pixel of the digital imager during a second frame of pixels of
22 image data created by the digital imager.

1 37. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a number of saturated pixels;

4 (b) selecting a first illumination intensity level mapping function when the determined
5 number of saturated pixels is above a first threshold;

6 (c) determining a number of pixels having illumination intensity levels within a defined
7 range of values;

8 (d) selecting a second illumination intensity level mapping function when the determined
9 number of pixels is below a second threshold;

10 (e) determining a transfer control function based on the selected illumination intensity
11 level mapping function; and

12 (f) imposing the determined transfer control function upon a pixel of the digital imager.

1 38. (Previously Presented) The method as claimed in claim 37, wherein the first
2 illumination intensity level mapping function represents a greater compression of the resolution
3 of the high illumination intensity levels of the scene than the second illumination intensity level
4 mapping function.

1 39. (Previously Presented) The method as claimed in claim 37, wherein said
2 determination of the number of pixels having illumination intensity levels within a defined range
3 of values determines the number of pixels when the determined number of saturated pixels is
4 below a first threshold.

1 40. (Previously Presented) The method as claimed in claim 37, further comprising:

2 (g) determining a number of pixels having illumination intensity levels within a specified
3 range of illumination intensity levels; and

4 (h) determining an integration time based upon the determined number of pixels having
5 illumination intensity levels within a specified range of illumination intensity levels;

6 said determination of the transfer control function being determined based on the selected
7 illumination intensity level mapping function and the determined integration time.

1 41. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) determining a number of pixels of image data having illumination intensity levels
4 within a first defined range of illumination intensity levels, the first defined range of illumination
5 intensity levels including an illumination intensity level corresponding to a pixel saturation
6 value;

7 (b) determining an illumination intensity level mapping function based upon the
8 determined number of pixels within the first defined range of illumination intensity levels;

9 (c) determining a number of pixels having illumination intensity levels within a second
10 defined range of illumination intensity levels, the second defined range of illumination intensity
11 levels including an illumination intensity level corresponding to a minimum illumination
12 intensity level;

13 (d) determining an integration time based upon the determined number of pixels having
14 illumination intensity levels within the second defined range of illumination intensity levels;

15 (e) determining a transfer control function based on the determined illumination intensity
16 level mapping function and the determined integration time; and

17 (f) imposing the determined transfer control function upon a pixel of the digital imager.

1 42. (Previously Presented) The method as claimed in claim 41, wherein the transfer
2 control function comprises a plurality of discrete transfer control functions.

1 43. (Previously Presented) The method as claimed in claim 41, wherein the transfer
2 control function comprises eight discrete transfer control functions.

1 44. (Previously Presented) The method as claimed in claim 43, wherein the determined
2 illumination intensity level mapping function comprises a plurality of discrete illumination
3 intensity level mapping functions.

1 45. (Previously Presented) The method as claimed in claim 43, wherein the determined
2 illumination intensity level mapping function comprises eight discrete illumination intensity
3 level mapping functions.

1 46. (Withdrawn) The method as claimed in claim 44, wherein each discrete transfer
2 control function is determined based on one of the plurality of distinct illumination intensity
3 level mapping functions.

1 47. (Previously Presented) The method as claimed in claim 45, wherein each discrete
2 transfer control function is determined based on one of the eight distinct illumination intensity
3 level mapping functions.

1 48. (Previously Presented) The method as claimed in claim 44, wherein each discrete
2 illumination intensity level mapping function is a linear illumination intensity level mapping
3 function.

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2 49. (Previously Presented) The method as claimed in claim 45, wherein each discrete
3 illumination intensity level mapping function is a linear illumination intensity level mapping
4 function.

1 50. (Previously Presented) The method as claimed in claim 48, wherein the plurality of
2 discrete linear illumination intensity level mapping functions form a composite piece-wise linear
3 illumination intensity level mapping function, the composite piece-wise linear compression
4 being the determined illumination intensity level mapping function, the determined illumination
5 intensity level mapping function being a nearly logarithmic illumination intensity level mapping
6 function.

1 51. (Previously Presented) The method as claimed in claim 49, wherein the eight discrete
2 linear illumination intensity level mapping functions form a composite piece-wise linear
3 illumination intensity level mapping function, the composite piece-wise linear compression
4 being the determined illumination intensity level mapping function, the determined illumination
5 intensity level mapping function being a nearly logarithmic illumination intensity level mapping
6 function.

1 52. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 (a) selecting a first illumination intensity level mapping function;

4 (b) determining a first transfer control function based on the selected first compression;

5 (c) imposing the determined first transfer control function upon a pixel of the digital
6 imager;

7 (d) determining a histogram of illumination intensity levels of pixels of image data being
8 generated by the digital imager having the determined first transfer control function imposed
9 thereon;

10 (e) determining an illumination intensity level maximum, the illumination intensity level
11 maximum representing a greatest illumination intensity level for a pixel in a sample forming the
12 histogram;

13 (f) determining a second illumination intensity level mapping function, based on the
14 determined intensity level maximum, the second illumination intensity level mapping function
15 preventing the generation of any saturated pixels and providing a dynamic range of image data
16 enabling each level in the histogram to be realized by the digital imager;

17 (g) determining a second transfer control function based on the determined second
18 illumination intensity level mapping function; and

19 (h) imposing the determined second transfer control function upon a pixel of the digital
20 imager.

1 53. (Previously Presented) The method as claimed in claim 52, wherein the first
2 illumination intensity level mapping function represents a greater compression of the resolution
3 of the high illumination intensity levels of the scene than the second illumination intensity level
4 mapping function.

1 Claims 54-58 Cancelled

1 59. (Currently Amended) A system for adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

an illumination intensity level mapping controller, operatively connected to the digital imager, to determine a number of pixels of image data having illumination intensity levels within a first defined range of illumination intensity levels and to determine an illumination intensity level mapping function based upon the determined number of pixels within the first defined range of illumination intensity levels; and

a transfer control function generation circuit, operatively connected to the digital imager and said illumination intensity level mapping controller, to determine a transfer control function based on the determined illumination intensity level mapping function and to impose the determined transfer control function upon a pixel of the digital imager; and

an exposure controller, operatively connected to the digital imager and said transfer control function generation circuit, to determine a number of pixels having illumination intensity levels within a second defined range of illumination intensity levels and to determine an integration time based upon the determined number of pixels having illumination intensity levels within a second defined range of illumination intensity levels;

said transfer control function generation circuit determining said transfer control function based on the determined illumination intensity level mapping function and the determined integration time.

60. Cancelled

61. (Original) The system as claimed in claim 59, wherein the first defined range of illumination intensity levels is a range of illumination intensity levels including an illumination intensity level representing pixel saturation.

62. (Currently Amended) The system as claimed in claim ~~60~~59, wherein the second defined range of illumination intensity levels is a range of illumination intensity levels including an illumination intensity level representing a minimum illumination intensity level.

63. (Currently Amended) The system as claimed in claim ~~60~~59, wherein the first defined range of illumination intensity levels is a range of illumination intensity levels including an illumination intensity level representing pixel saturation and the second defined range of

4 illumination intensity levels is a range of illumination intensity levels including an illumination
5 intensity level representing a minimum illumination intensity level adjusted for a pixel offset
6 value.

1 64. (Original) The system as claimed in claim 59, wherein said illumination intensity
2 level mapping controller determines a number of pixels of image data having illumination
3 intensity levels within a first defined range of illumination intensity levels from a frame of pixels
4 of image data created by the digital imager.

1 65. (Original) The system as claimed in claim 59, wherein said illumination intensity
2 level mapping controller determines a number of pixels of image data having illumination
3 intensity levels within a first defined range of illumination intensity levels from a partial frame of
4 pixels of image data created by the digital imager.

1 66. (Original) The system as claimed in claim 59, wherein said illumination intensity
2 level mapping controller determines a number of pixels of image data having illumination
3 intensity levels within a first defined range of illumination intensity levels from a defined area
4 within a frame of pixels of image data created by the digital imager.

1 67. (Original) The system as claimed in claim 59, wherein said illumination intensity
2 level mapping controller determines a number of pixels of image data having illumination
3 intensity levels within a first defined range of illumination intensity levels from a user-defined
4 area within a frame of pixels of image data created by the digital imager.

1 68. (Original) The system as claimed in claim 59, wherein the determined illumination
2 intensity level mapping function is a calculated illumination intensity level mapping function, the
3 calculation being based upon the determined number of pixels within the first defined range of
4 illumination intensity levels.

1 69. (Original) The system as claimed in claim 59, wherein the determined illumination
2 intensity level mapping function is a selected illumination intensity level mapping function

3 selected from a plurality of pre-specified illumination intensity level mapping functions, the
4 selection being based upon the determined number of pixels within the first defined range of
5 illumination intensity levels.

1 70. (Original) The system as claimed in claim 59, wherein the determined transfer control
2 function is a calculated transfer control function, the calculation being based upon the
3 determined illumination intensity level mapping function.

1 71. (Original) The system as claimed in claim 59, wherein the determined transfer control
2 function is a selected transfer control function from a plurality of pre-specified transfer control
3 functions, the selection being based upon the determined illumination intensity level mapping
4 function.

1 72. (Currently Amended) The system as claimed in claim ~~60~~59, wherein the determined
2 transfer control function is a calculated transfer control function, the calculation being based
3 upon the determined illumination intensity level mapping function and determined integration
4 time.

1 73. (Currently Amended) The system as claimed in claim ~~60~~59, wherein the determined
2 transfer control function is a selected transfer control function from a plurality of pre-specified
3 transfer control functions, the selection being based upon the determined illumination intensity
4 level mapping function and determined integration time.

1 74. (Previously Presented) A system for adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:
3 an illumination intensity level mapping controller, operatively connected to the digital
4 imager, to determine a number of pixels of image data having illumination intensity levels within
5 a first defined range of illumination intensity levels and to determine an illumination intensity
6 level mapping function based upon the determined number of pixels within the first defined
7 range of illumination intensity levels; and

8 a transfer control function generation circuit, operatively connected to the digital imager
9 and said illumination intensity level mapping controller, to determine a transfer control function
10 based on the determined illumination intensity level mapping function and to impose the
11 determined transfer control function upon a pixel of the digital imager;

12 said illumination intensity level mapping controller determines a number of pixels of
13 image data having illumination intensity levels within a first defined range of illumination
14 intensity levels during a period of time that the digital imager is creating a second frame of
15 pixels;

16 said illumination intensity level mapping controller determines the illumination intensity
17 level mapping function based upon the determined number of pixels of image data having
18 illumination intensity levels within a first defined range of illumination intensity levels during
19 the period of time that the digital imager is creating the second frame of pixels; and

20 said transfer control function generation circuit imposes the determined transfer control
21 function upon a pixel of the digital imager during a third frame of pixels of image data being
22 created by the digital imager.

1 75. (Previously Presented) A system for adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 an illumination intensity level mapping controller, operatively connected to the digital
4 imager, to determine a number of pixels of image data having illumination intensity levels within
5 a first defined range of illumination intensity levels and to determine an illumination intensity
6 level mapping function based upon the determined number of pixels within the first defined
7 range of illumination intensity levels; and

8 a transfer control function generation circuit, operatively connected to the digital imager
9 and said illumination intensity level mapping controller, to determine a transfer control function
10 based on the determined illumination intensity level mapping function and to impose the
11 determined transfer control function upon a pixel of the digital imager;

12 said illumination intensity level mapping controller determines a number of pixels of
13 image data having illumination intensity levels within a first defined range of illumination
14 intensity levels during a period of time that the digital imager is creating a first frame of pixels;

15 said illumination intensity level mapping controller determines the illumination intensity
16 level mapping function based upon the determined number of pixels of image data having
17 intensity levels within a first defined range of intensity levels during the period of time that the
18 digital imager is creating the first frame of pixels; and

19 said transfer control function generation circuit imposes the determined transfer control
20 function upon a pixel of the digital imager during a second frame of pixels of image data being
21 created by the digital imager.

1 76. (Currently Amended) The system as claimed in claim 6059, wherein the illumination
2 intensity level mapping function is determined independently of the determination of the
3 integration time.

1 77. (Currently Amended) The system as claimed in claim 6059, wherein the
2 determinations of the illumination intensity level mapping function and integration time are
3 dependent thereupon.

1 78. (Currently Amended) The system as claimed in claim 6059, wherein the illumination
2 intensity level mapping function is determined prior to the determination of the integration time.

1 79. (Currently Amended) The system as claimed in claim 6059, wherein the illumination
2 intensity level mapping function is determined after the determination of the integration time.

1 80. (Currently Amended) The system as claimed in claim 6059, wherein determinations
2 of the illumination intensity level mapping function and the integration time are determined
3 substantially simultaneously.

1 81. (Original) The system as claimed in claim 59, wherein said illumination intensity
2 level mapping controller determines, for each of a plurality of defined ranges of illumination
3 intensity levels, a number of pixels within the defined range of illumination intensity levels when
4 the determined number of pixels within the first defined range of illumination intensity levels is
5 above a first threshold;

6 said illumination intensity level mapping controller determines, for each defined range of
7 illumination intensity levels, an illumination intensity level mapping function based upon the
8 determined number of pixels within the defined ranges of illumination intensity levels.

1 82. (Currently Amended) A system for adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 an illumination intensity level mapping controller, operatively connected to the digital
4 imager, to determine a plurality of number of pixels, each determined number of pixels being a
5 number of pixels within an associated defined range of illumination intensity levels and to
6 determine a plurality of illumination intensity level mapping functions, each determined
7 illumination intensity level mapping function corresponding to one defined range of illumination
8 intensity levels, each illumination intensity level mapping function being determined based upon
9 the determined number of pixels within an associated defined range of illumination intensity
10 levels; ~~and~~

11 a transfer control function generation circuit, operatively connected to the digital imager
12 and said illumination intensity level mapping controller, to determine a transfer control function
13 based on the plurality of determined illumination intensity level mapping functions and to
14 impose the determined transfer control function upon a pixel of the digital imager; and

1 an exposure controller, operatively connected to the digital imager and said transfer
2 control function generation circuit, to determine a number of pixels having illumination intensity
3 levels within a specified range of illumination intensity levels and to determine an integration
4 time based upon the determined number of pixels having illumination intensity levels within a
5 specified range of illumination intensity levels;

6 said transfer control function generation circuit determining said transfer control function
7 based on the plurality of determined illumination intensity level mapping functions and the
8 determined integration time.

1 83. Cancelled

1 84. (Currently Amended) The system as claimed in claim ~~83~~82, wherein the specified
2 range of illumination intensity levels is a range of illumination intensity levels including an
3 illumination intensity level representing a minimum illumination intensity level.

1 85. (Currently Amended) The system as claimed in claim ~~83~~82, wherein the specified
2 range of illumination intensity levels is a range of illumination intensity levels including an
3 illumination intensity level representing a minimum illumination intensity level adjusted for a
4 pixel offset value.

1 86. (Original) The system as claimed in claim 82, wherein said illumination intensity
2 level mapping controller determines each number of pixels corresponding to one defined range
3 of illumination intensity levels from a frame of pixels of image data created by the digital
4 imager.

1 87. (Original) The system as claimed in claim 82, wherein said illumination intensity
2 level mapping controller determines each number of pixels corresponding to one defined range
3 of illumination intensity levels from a partial frame of pixels of image data created by the digital
4 imager.

1 88. (Original) The system as claimed in claim 82, wherein said illumination intensity
2 level mapping controller determines each number of pixels corresponding to one defined range
3 of illumination intensity levels from a defined area within a frame of pixels of image data created
4 by the digital imager.

1 89. (Original) The system as claimed in claim 82, wherein said illumination intensity
2 level mapping controller determines each number of pixels corresponding to one defined range
3 of illumination intensity levels from a user-defined area within a frame of pixels of image data
4 created by the digital imager.

1 90. (Previously Presented) A system for adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

an illumination intensity level mapping controller, operatively connected to the digital imager, to determine a plurality of number of pixels, each determined number of pixels being a number of pixels within an associated defined range of illumination intensity levels and to determine a plurality of illumination intensity level mapping functions, each determined illumination intensity level mapping function corresponding to one defined range of illumination intensity levels, each illumination intensity level mapping function being determined based upon the determined number of pixels within an associated defined range of illumination intensity levels; and

a transfer control function generation circuit, operatively connected to the digital imager and said illumination intensity level mapping controller, to determine a transfer control function based on the plurality of determined illumination intensity level mapping functions and to impose the determined transfer control function upon a pixel of the digital imager;

said illumination intensity level mapping controller determines each number of pixels corresponding to one defined range of illumination intensity levels during a period of time that the digital imager is creating a second frame of pixels;

said illumination intensity level mapping controller determines each illumination intensity level mapping function corresponding to one of the defined ranges of illumination intensity levels during the period of time that the digital imager is creating the second frame of pixels; and

said transfer control function generation circuit imposes the determined transfer control function upon a pixel of the digital imager during a third frame of pixels of image data created by the digital imager.

91. (Previously Presented) A system for adaptively controlling sensitivity, on a pixel-by-pixel basis, of a digital imager, comprising:

an illumination intensity level mapping controller, operatively connected to the digital imager, to determine a plurality of number of pixels, each determined number of pixels being a number of pixels within an associated defined range of illumination intensity levels and to determine a plurality of illumination intensity level mapping functions, each determined illumination intensity level mapping function corresponding to one defined range of illumination intensity levels, each illumination intensity level mapping function being determined based upon

9 the determined number of pixels within an associated defined range of illumination intensity
10 levels; and

11 a transfer control function generation circuit, operatively connected to the digital imager
12 and said illumination intensity level mapping controller, to determine a transfer control function
13 based on the plurality of determined illumination intensity level mapping functions and to
14 impose the determined transfer control function upon a pixel of the digital imager;

15 said illumination intensity level mapping controller determines each number of pixels
16 corresponding to one defined range of illumination intensity levels during a period of time that
17 the digital imager is creating a first frame of pixels;

18 said illumination intensity level mapping controller determines each illumination
19 intensity level mapping function corresponding to one of the defined ranges of illumination
20 intensity levels during the period of time that the digital imager is creating the first frame of
21 pixels; and

22 said transfer control function generation circuit imposes the determined transfer control
23 function upon a pixel of the digital imager during a second frame of pixels of image data created
24 by the digital imager.

1 92. (Previously Presented) A system for adaptively controlling sensitivity, on a pixel-by-
2 pixel basis, of a digital imager, comprising:

3 an illumination intensity level mapping controller, operatively connected to the digital
4 imager, to determine a number of saturated pixels and to select a first illumination intensity level
5 mapping function when the determined number of saturated pixels is above a first threshold;

6 said illumination intensity level mapping controller determining an number of pixels
7 having illumination intensity levels within a defined range of values and selecting a second
8 illumination intensity level mapping function when the determined number of pixels is below a
9 second threshold; and

10 a transfer control function generation circuit, operatively connected to the digital imager
11 and said illumination intensity level mapping controller, to determine a transfer control function
12 based on the selected illumination intensity level mapping function and to impose the determined
13 transfer control function upon a pixel of the digital imager.

1 93. (Previously Presented) The system as claimed in claim 92, wherein the first
2 illumination intensity level mapping function represents a greater compression of the resolution
3 of the high illumination intensity levels of the scene than the second illumination intensity level
4 mapping function.

1 94. (Previously Presented) The system as claimed in claim 92, wherein said illumination
2 intensity level mapping controller determines the number of pixels when the determined number
3 of saturated pixels is below a first threshold.

1 95. (Previously Presented) The system as claimed in claim 92, further comprising:
2 an exposure controller, operatively connected to the digital imager and said transfer
3 control function generation circuit, to determine a number of pixels having illumination intensity
4 levels within a specified range of illumination intensity levels and to determine an integration
5 time based upon the determined number of pixels having illumination intensity levels within a
6 specified range of illumination intensity levels;
7 said transfer control function generation circuit determining the transfer control function
8 based on the selected illumination intensity level mapping function and the determined
9 integration time.

1 96. (Original) A system for adaptively controlling sensitivity, on a pixel-by-pixel basis,
2 of a digital imager, comprising:

3 an illumination intensity level mapping controller, operatively connected to the digital
4 imager, to determine a number of pixels of image data having illumination intensity levels within
5 a first defined range of illumination intensity levels, the first defined range of illumination
6 intensity levels including an illumination intensity level corresponding to a pixel saturation
7 value, and to determine an illumination intensity level mapping function based upon the
8 determined number of pixels within the first defined range of illumination intensity levels;

9 an exposure controller, operatively connected to the digital imager, to determine a
10 number of pixels having illumination intensity levels within a second defined range of
11 illumination intensity levels, the second defined range of illumination intensity levels including
12 an illumination intensity level corresponding to a minimum illumination intensity level, and to

13 determine an integration time based upon the determined number of pixels having illumination
14 intensity levels within the second defined range of illumination intensity levels; and

15 a transfer control function generation circuit, operatively connected to the digital imager,
16 said exposure controller and said illumination intensity level mapping controller, to determine a
17 transfer control function based on the determined illumination intensity level mapping function
18 and the determined integration time and to impose the determined transfer control function upon
19 a pixel of the digital imager.

1 97. (Original) The system as claimed in claim 96, wherein the transfer control function
2 comprises a plurality of discrete transfer control functions.

1 98. (Original) The system as claimed in claim 96, wherein the transfer control function
2 comprises eight discrete transfer control functions.

1 99. (Original) The system as claimed in claim 97, wherein the determined illumination
2 intensity level mapping function comprises a plurality of discrete illumination intensity level
3 mapping functions.

1 100. (Original) The system as claimed in claim 98, wherein the determined illumination
2 intensity level mapping function comprises eight discrete illumination intensity level mapping
3 functions.

1 101. (Original) The system as claimed in claim 99, wherein each discrete transfer control
2 function is determined based on one of the plurality of distinct illumination intensity level
3 mapping functions.

1 102. (Original) The system as claimed in claim 100, wherein each discrete transfer
2 control function is determined based on one of the eight distinct illumination intensity level
3 mapping functions.

1 103. (Original) The system as claimed in claim 99, wherein each discrete illumination
2 intensity level mapping function is a linear illumination intensity level mapping function.

1 104. (Original) The system as claimed in claim 100, wherein each discrete illumination
2 intensity level mapping function is a linear illumination intensity level mapping function.

1 105. (Original) The system as claimed in claim 103, wherein the plurality of discrete
2 linear illumination intensity level mapping functions form a composite piece-wise linear
3 illumination intensity level mapping function, the composite piece-wise linear compression
4 being the determined illumination intensity level mapping function, the determined illumination
5 intensity level mapping function being a nearly logarithmic illumination intensity level mapping
6 function.

1 106. (Original) The system as claimed in claim 104, wherein the eight discrete linear
2 illumination intensity level mapping functions form a composite piece-wise linear illumination
3 intensity level mapping function, the composite piece-wise linear compression being the
4 determined illumination intensity level mapping function, the determined illumination intensity
5 level mapping function being a nearly logarithmic illumination intensity level mapping function.

1 107. (Original) A system for adaptively controlling sensitivity, on a pixel-by-pixel basis,
2 of a digital imager, comprising:

3 an illumination intensity level mapping controller, operatively connected to the digital
4 imager, to select a first illumination intensity level mapping function; and

5 a transfer control function generation circuit, operatively connected to the digital imager
6 and said illumination intensity level mapping controller, to determine a first transfer control
7 function based on the selected first compression and to impose the determined first transfer
8 control function upon a pixel of the digital imager;

9 said illumination intensity level mapping controller determining a histogram of
10 illumination intensity levels of pixels of image data being generated by the digital imager having
11 the determined first transfer control function imposed thereon;

12 said illumination intensity level mapping controller determining an illumination intensity
13 level maximum, the illumination intensity level maximum representing a greatest illumination
14 intensity level for a pixel in a sample forming the histogram;

15 said illumination intensity level mapping controller determining a second illumination
16 intensity level mapping function, based on the determined intensity level maximum, the second
17 illumination intensity level mapping function preventing the generation of any saturated pixels
18 and providing a dynamic range of image data enabling each level in the histogram to be realized
19 by the digital imager;

20 said transfer control function generation circuit determining a second transfer control
21 function based on the determined second illumination intensity level mapping function;

22 said transfer control function generation circuit imposing the second determined transfer
23 control function upon a pixel of the digital imager.

1 108. (Original) The system as claimed in claim 107, wherein the first illumination
2 intensity level mapping function represents a greater compression of the resolution of the high
3 illumination intensity levels of the scene than the second illumination intensity level mapping
4 function.

1 Claims 109-113 Cancelled